BULLETIN

# AMERICAN CONGRESS ON SURVEYING AND MAPPING

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BULLETIN

American Congress on Surveying and Mapping

JULY 1943

## MAPPING EXPERTS TO MEET IN WASHINGTON, D. C.

MAPPING experts from South America, Mexico, and Canada will meet in Washington on September 15 next to confer on matters of great interest to the hemispheric mapping program. The meeting is being called under the auspices of the American Geographical Society at the suggestion of the Committee on Cartography of the Pan American Institute of Geography and History, and is expected to last some two weeks. The conferees will meet first in Washington and then in New York.

The program calls for discussion of the following:

(a) Geodetic control, in its various phases, including triangulation, leveling, astronomic positions, gravity and magnetic observations, etc.

(b) The methods and procedures incident to the establishment of a geodetic network covering South America, to be tied in at a later date with the North American datum of 1927, so as to link South America, Mexico, the United States, Canada, and Alaska into one unbroken system.

(c) Topographic mapping, covering methods, scales, conventional symbols, etc., together with consideration of compilation and reproduction methods, including the use of colors and procedure for keeping maps current.

(d) Aeronautical charts. This will be of particular importance because so little has been done in South America, and therefore offers an opportunity to establish, from the very beginning, uniformity in such matters as projection, scale, overlap, conventional symbols, amount of topographic detail to be shown, and colors.

Conducted visits of inspection will be made to the major mapping establishments of the United States Government, and the visitors will be given every feasible opportunity to become acquainted not only with American maps but with American map makers as well.

It is hoped that the American Congress on Surveying and Mapping will be able to extend certain courtesies to the distinguished visitors. The membership will be circularized in this respect as soon as further details are available.

# OUR NEW PRESIDENT

George Dewey Whitmore, the Third President of the American Congress on Surveying and Mapping, was born in Hillman, Michigan, April 25, 1898. He received his education in the public schools of Jackson, Michigan, and completed the Civil Engineering Course of the International Correspondence Schools.

He is married and has six children—three boys and three girls. Two of the boys are already in the armed services, and the third expects to be in the near future.

For the past 25 years, he has been actively engaged in surveying and mapping work, and has been in responsible charge of many projects including reconnaissance, exploratory, city, and geodetic surveys. From 1922 to 1933 he was associated with R. H. Randall and Company, serving in various capacities from engineer in charge of control and topographic surveys to assistant chief engineer in charge of geodetic, topographic, and cadastral survey projects in a number of municipalities. He was also resident engineer in charge of control and topographic surveys of a 155,000-acre irrigation district in the Rio Grande Valley.

Since 1934 Mr. Whitmore has been with the Tennessee Valley Authority as Chief of the Survey Section of the Maps and Surveys Division.

"GIVE US A MAP, GEORGE!"
(From the Tennessee Valley Engineer)

His professional affiliations include memberships in the American Society of Civil Engineers, serving on the Committee on City Survey Procedure and the Committee on Precise Leveling; the American Society of Photogrammetry, serving as President of the Tennessee Valley Section in 1939, as a Director in 1940-41, and is now Chairman of the Committee on Map Specifications and Tests; the Society of American Military Engineers; the Surveying Teachers Conference; the National Planning Conference; and the American Congress on Surveying and Mapping, serving as Vice President of Region 3 until his election as President.

He is the author of a number of text books and publications on surveying and mapping and is co-author of "Technical Procedure for City Surveys," the Manual prepared under the auspices of the American Society of Civil Engineers.

Mr. Whitmore brings to the Congress a rich background of organization experience together with a youthful zeal and determination to do his share in realizing the aims of the American Congress on Surveying and Mapping.

# A MESSAGE TO THE MEMBERS

THE American Congress on Surveying and Mapping is now beginning its third year. It is customary at such a time to take inventory, review past accomplishments, and make plans for the future. This message therefore starts with a brief inventory of the principal accomplishments during these past two years.

First, the membership has grown, from the approximately 100 who attended the First Annual Meeting in June 1941, to more than 500. The evidence from dues payments and returns of letter ballots indicates that a majority of those enrolled may be considered active and interested members. Also, three successful annual meetings have been held, the interest and attendance at this year's meeting being especially gratifying, in view of wartime travel and other restrictions.

Another favorable factor is that the members represent all branches of the profession. Included are prominent leaders of the teaching group, the instrument manufacturers, the professional cartographers and geographers, commercial photogrammetrists, private surveyors, city and county surveyors, and government-employed surveyors and mappers. This wide representation is considered especially favorable.

Another accomplishment of note is the starting and maintaining publication of the Bulletin under difficult circumstances. The getting out of this publication represents considerable work, most of which is done by a very capable editor, assisted by a small group of interested members of the Congress. It is a matter of considerable satisfaction that the last two issues of the Bulletin have been larger and better than previous ones, and it is predicted that this trend will continue.

Financially, the condition of the Congress may be said to be satisfactory, considering the number of members, but it is hoped that there will be considerable improvement in the near future. It is worth noting that there is more money in the treasury now than at any time during the past year and a half. In this connection it is interesting also to note that during the past six months four instrument manufacturing concerns have taken out commercial memberships—an indication, incidentally, that these business houses foresee some advantages from membership in the Congress.

Against this brief list of favorable items should be considered a few that are not so favorable. Chief among these is the fact that the rate of membership increase was not maintained during the second year. We are still increasing our total membership but, compared to the first year, at a greatly reduced rate. Second, there are not nearly enough private surveyors and city and county surveyors among the members. These groups

ought to be the largest in the Congress, but at present they are actually the smallest, relatively. The Congress obviously has so far been unsuccessful in reaching these branches of the profession, and of course will not fulfill its ultimate goals until these groups have joined in large numbers. Third, regional and local activities have been slow to get started, probably in part due to the rapid shifting about and the high-speed business activities resulting from the war. Fourth, members have been extremely lax in submitting material for publication in the Bulletin.

As to our plans for the future, especially the coming year, the ideas of your Executive Committee as to practical and feasible aims may be simply stated as follows:

1. Try harder to get in new members, especially from the ranks of surveyors in private practice, and from county and city surveyors.
2. As rapidly as finances permit, expand and change the content of the Bulletin, so that eventually it will emerge as a full-fledged Surveying and Mapping Journal, but not to solicit advertising at present.

Obviously if the Bulletin can be improved, made larger, published more often, it will of itself attract many new members. Conversely, the size and quality of the Bulletin, or Journal, depend on the funds available, this in turn depending in large measure on the total membership of the Congress. It sounds like a vicious circle, but your Executive Committee believes considerable can be accomplished along these lines in the near future, in spite of all the obvious difficulties of these times.

Members of the Congress can help greatly with these immediate aims, first by interesting professional friends and acquaintances in joining the Congress, and second by sending in papers, articles, news, and other interesting items for publication in the Bulletin. In regard to signing up new members there should be no hesitancy on the part of any present member. As ex-president Dodds says: "The rank and file of surveyors want to belong to a national surveying organization. They will gladly pay dues. They want to attend conventions and they want to read about each other and about surveying." It may be that for a short time the Congress will not have a great deal to offer new members in the way of direct personal benefits, but sooner or later the Congress will become a strong influence in surveying and mapping affairs, will publish a real surveying and mapping journal, and will directly and indirectly assist in advancing the science and in improving the status of the profession.

A message of this sort would not be complete without giving public recognition to two hard-working and capable officers of the Congress, the Secretary-Treasurer, and the Editor of the Bulletin. It is announced with sincere regret that Secretary-Treasurer Warren T. Ellis, of the U. S. Depart-

ment of Agriculture, has found it necessary to give up this office. Mr. Ellis is a member of the Naval Reserve, and expects to be called to active service in the immediate future. He has worked faithfully and efficiently for the Congress during the past several months, and deserves great credit and the sincere thanks of the officers and members of this Congress. He will be succeeded by Mr. Richard T. Evans, a field topographic engineer of the U. S. Geological Survey, now stationed in Washington. Mr. Evans has had many years of experience in surveying and mapping, and brings to the office a high enthusiasm for the aims of the Congress. Thanks to Mr. Ellis—best wishes to Mr. Evans.

A most important individual in the administration of the Congress is the Editor, Mr. A. L. Shalowitz, a cartographic engineer of the U. S. Coast and Geodetic Survey, who has had considerable experience in surveying and mapping, and in technical writing and editorial work. The excellence of Mr. Shalowitz' work is attested by the quality of this and recent Bulletins. He can't, however, publish a Bulletin unless he gets copy, and therefore requests the members to cooperate with him in this respect. He states: "The value of the Bulletin will depend on its content, and its content will be determined by the availability of material. Many of our members are contributing articles on surveying and mapping to other more established journals, and it is not too much to expect that they divert some of those efforts in our direction."

GEORGE D. WHITMORE,
President.

## CONGRESS APPOINTMENTS

DOUGLAS S. TROWBRIDGE, Professor of Civil Engineering at New York University has been named Vice President of Region 1. He has also been appointed a member of the Executive Committee of the Congress.

# THE THIRD ANNUAL MEETING

THE Third Annual Meeting of the American Congress on Surveying and Mapping was held on June 4 and 5, 1943 at Washington, D. C. On the evening of June 4, an informal gathering was held at the Cosmos Club where old friendships were renewed and new ones made.

The Congress officially opened Saturday morning, June 5 in the Rose Room of the Washington Hotel, with 150 members and guests present. That it was a wartime Congress was evident from the large number in uniform. In the absence of President Dodds, who at the last moment was unable to attend, Vice President Wright of Region 2 presided. Mr. Wright stated that notwithstanding certain handicaps under which the Congress is working during the wartime period, its potentialities are great and there is every reason to view its future hopefully. After naming a Tellers Committee, he called on Mr. Robert H. Randall, of the Bureau of the Budget to preside over the panel discussion on "Maps and Charts for War."

## Panel Discussion

Mr. Randall stated at the outset that the discussion would be conducted on an informal but security basis, since many things happen in connection with maps and charts in wartime that must be discussed guardedly.

The following representatives of the Navy, War, and Commerce Departments comprised the panel:

Rear Admiral George S. Bryan, Hydrographer of the Navy.

Colonel Herbert H. Loper, Chief Intelligence Branch, Corps of Engineers.

Lieut. Colonel Gerald FitzGerald, Chief, Aeronautical Chart Service, A. A. F.

Lieut. Commander Paul A. Smith, Chief, Aeronautical Chart Branch, U. S. Coast and Geodetic Survey.

The discussion covered two broad aspects of the war mapping program, namely; the kind of maps and charts being produced, and the organizations and methods used to produce them.

1. REAR ADMIRAL BRYAN discussed briefly the limitations of the early nautical charts, which he said led to the development of the Mercator projection. The most significant fact about this projection is that it was dictated by the mariners of that time to satisfy a particular purpose. This, he said, is fundamental even today in the making of charts—the user is entitled to have a say in the kind of charts he wants, although other factors must be considered, such as, scale, area to be covered, overlap, and style.

Admiral Bryan stated that the Hydrographic Office has been making nautical charts for over a century and aeronautical charts since 1925, so that when war broke out, it was more a question of expansion rather than reorganization. For an area that had been previously covered it was merely a question of compilation, otherwise new surveys had to be made. He said there was no essential difference between navigation

on sea and in the air, and hence the requirements for aeronautical charts are not greatly different from those of nautical charts—simplicity being the keynote in both.

Admiral Bryan also discussed the different series of aeronautical charts published by his agency. (See pages 7 and 8 of the April, 1943 Bulletin.)

2. COLONEL LOPER told of the land maps produced by the Army. He said the types are innumerable and range from small-scale global maps used for planning, to local maps of great detail for occupying an area; the amount of information shown on a map depending on the purpose and intensity of an operation. Since it is not possible to go into enemy countries to obtain the information, maps are restricted to what has gone before aided by research of what has happened in an area since the last map publication. Fortunately, he indicated, most of our fighting will be done in well developed countries where much mapping has been done; hence we will have a better grade of map information for our Forces.

Regarding the topographic mapping program inaugurated by the War Department in 1941, Colonel Loper explained that the complete mapping of the United States as a basis of National defense had been advocated by the military long before our entry into the war, but little headway could be made either from the military or civilian approach until the growing seriousness of the international situation revised our thinking and a program for mapping the more strategically critical areas was approved. This has been accomplished on a cooperative basis with other federal agencies capable of doing topographic mapping. These maps are standard topographic maps on manuscript scales of 1:20,000 and are being reproduced on scales from 1:20,000 to 1:62,500. He stated that the program has been quite successful and that the maps constitute a fine series not only for defense purposes, but for use in civil planning and construction in a more peaceful period.

3. LIEUT. COLONEL FITZGERALD explained the various series of charts of the Army Air Forces; their scales, information shown, number of charts in each series, and the percentage completed. (See pages 7 and 8 of the April, 1943 Bulletin.) He said the most needed chart is the 1:1,000,000 scale pilotage chart.

Regarding the organizations producing these charts, Colonel FitzGerald stated that the Army Air Force is essentially a planning and control agency with a small Washington staff. To avoid building up a separate mapping organization of its own, with all this would have involved, the Army Air Forces enlisted the services of existing federal map-making agencies and qualified commercial organizations. This, he said, gave them almost at the outset a well-trained organization with six to seven thousand cartographers and lithographers ready for the program.

4. LIEUT. COMMANDER SMITH discussed the work of the Coast and Geodetic Survey in relation to the aeronautical chart program of the Army Air Forces. Besides the publication of nautical charts and the establishment of the basic control for the Country, which it has been doing for a century and a quarter, the Coast and Geodetic Survey has in recent years also served the commercial needs of the Nation in the matter of aeronautical charts. He said the aeronautical chart has been one phase of mapping activity which required the utmost in production for this war, and it was soon realized that changes in conventional cartographic methods would be necessary in order to meet aeronautical chart schedules. He stated that production line methods can be used and have been used, and that the greatest single factor towards speeding production has been in the development and use of plastics as a medium for

cartography. The problem of projection has been of considerable magnitude, not only in the computations involved but in their actual construction.

Commander Smith paid tribute to the outstanding part the American Geographical Society and the National Geographic Society have taken in our mapping program, as a result of their fine map collections and their compiled maps. He said the rapid expansion of map- and chart-making activities of the United States federal and commercial agencies to produce maps and charts for war needs, speaks well for our system of free enterprise and our Nation's inherent versatility.

A discussion from the floor followed, and it was developed that gazetters are being prepared of the various localities charted. This is being centralized by the United States Board on Geographical Names.

Mr. Snyder of the Soil Conservation Service told of the first all feminine field survey party which he organized. He said the hardest part of the experiment was in making up his mind that it could be done.

### Afternoon Session

The afternoon session was devoted mainly to the presentation and discussion of prepared papers in accordance with the announced program. Two of the papers are included in this issue of the Bulletin. The others will be published in the next number.

Professor Trowbridge, the Chairman of the Tellers Committee, advised of the election of Mr. George D. Whitmore as President of the Congress for the ensuing year. Mr. Whitmore thanked the membership for the honor and asked for their cooperation in furthering the work of the Congress.

Mr. Ellis, the treasurer, reported on the financial status of the Congress. This is printed elsewhere in this Bulletin.

Notice was taken of the death during the past year of four members of the Congress. Appropriate resolutions are being prepared.

The Chairman thanked Mr. Polling and his committee for the excellent arrangements made for the holding of the meeting. The Congress was then declared officially adjourned, after which the Executive Committee met to pass on the selection of a new Secretary and Treasurer, and to consider other matters.

The Third Annual Meeting of the American Congress on Surveying and Mapping will be remembered for the great interest it stimulated in the activities of the Congress. While the meeting was centrally fixed on the wartime effort, and clearly emphasized the tremendous job that was being done in supplying the Armed Forces with the necessary maps and charts, sufficient cognizance was taken of opportunities in surveying and mapping after the war to indicate in a general way the place the Congress may be expected to fill in the period of postwar adjustment.

# THE LAND SURVEYOR

WM. C. WATTLES, Licensed Surveyor, California

THE profession of land surveying is seldom given the attention and consideration it demands—either by the layman or the surveyor. The layman, student, and prospective surveyor usually regard a survey as a process of measuring and stake-setting, with the making of an occasional map thrown in for good measure. The average surveyor may view the undertaking with a little more respect, yet primarily measures it with the yardstick of business profit, giving of his attention and effort only in the ratio with the compensation involved. These view-points tend to relegate land surveying from a profession to that of a mere job of more or less skilled mechanical labor. It is a severe indictment against the profession that these things are a fact, particularly because they have been brought about mainly by the surveyors themselves (including engineers in the surveying business).

In California, as well as in other states, the regulation of land surveying has for its purpose: (1) the protection of the public from unskilled or unscrupulous practitioners, and (2) to effect a maximum possible protection to the efficient, ethical, and legitimate practitioner against bad or ruinous practices of his competitors. To accomplish this end it is very necessary that all applicants for a license as a land surveyor be tested for essential qualifications.

The results of written examinations given by the State Board of Registration for Civil Engineers show that many applicants taking the examinations do not have the fundamental knowledge required to undertake the general practice of land surveying. This is true despite the specific record of each applicant as to quantity of training and experience, which should, from the record, have been sufficient to produce satisfactory results. It appears then that the reason for failure in the written examination of most of the applicants is for the lack of training and experience of the proper quality, which is reflected back to the practitioners for whom the applicants have worked as subordinates.

It is claimed that while many licensed surveyors are weak or inefficient in the general practice of their profession, they are specialists in some particular branch thereof, and therefore need little or no acquaintance with the broader aspects of surveying. Thus, it is argued that the qualifying written examination is unwarranted. The absurdity of such claims, as an excuse for opening the door to anyone who wants to drag a chain or run a transit, is self-evident. The "grandfather clause" of the Land Surveyors' Act, of necessity, admitted many to practice who probably could not secure a license under present requirements, which is today no valid reason why specialized

practice should permit a surveyor to escape from a thorough working knowledge of general surveying principles. The practice of medicine requires training in all of its basic principles before permission to practice is attained, even though specialization is the ultimate goal of the applicant. Why not examinations in the principles of land surveying?

There are seven essential subdivisions forming the foundation and structure of land surveying, of which one or more enter into every problem confronting the surveyor. These are classified as follows:

1. *Mechanical Procedure:* Measurements with transit, tape, rod, and other instruments; mapping and use of drafting equipment; knowledge, ability, and judgment in proportion; and degree of accuracy required in the problem presented.

2. *Computations:* Mathematical procedures such as the use of arithmetic, geometry, algebra, and trigonometry.

3. *Public Lands:* All matters relating to the survey, resurvey, relocation of section lines, subdivision of sections and section corners, in the system of Government surveys, and any other public land or boundary lines, whether publicly or privately owned. The surveyor's familiarity with the Manual of Instructions for the Survey of the Public Lands of the United States, and the methods of analyses and procedures it specifies, is too often woefully lacking in spite of the requirement contained in the Land Surveyors' Act.

4. *Astronomy and Geodesy:* Methods of determining, by astronomic observation and precise triangulation, the positions of points on the earth's surface and their relation to each other, thereby referring such points to a general Nation-wide base, and to which local problems can be related when necessary. The application of these observations and precise triangulations, in modern surveying, is becoming more pertinent each day.

5. *Legal Description and Title Analysis:* The title as it appears of record is the basis of all problems affecting the boundaries of public or privately owned land, and the most essential factor in every survey involving ownership lines. A good working knowledge of legal construction of descriptions, and practical application of field work thereto with respect to existing monuments is vital to the accuracy of any location.

6. *Law and Ordinances:* The statutes governing the practice of surveying in the State; statutes governing the recording and filing of subdivisions and other maps or documents; regulatory ordinances of cities and counties with reference to such maps and documents; law and procedure involving surveys affecting registered (Torrens) land; pertinent and applicable court cases affecting title and boundaries of lands.

7. *Ethics:* The basic principle of the best work that can be done; a work for the work's sake; the matter of friendly relations with clients, employers, and employees; the training of subordinates to a high degree of proficiency; the inculcation of a respect for the profession; the spirit of cooperation and honest competition with other members of the profession; the financial principle that good work is entitled to fair recompense; and a refutation of the idea that the quality of work is contingent on price, value of land involved, or occupation. If it is worth doing at all, the work should be done well.

Subjects 1 and 2, and a small portion of 3, are those generally regarded as constituting the curriculum of surveying in schools and colleges. Too

often they alone comprise the stock in trade of the prospective surveyor, much to the detriment of the public.

Subject 4 has not been so commonly used in past practice. However, it is becoming increasingly necessary that the surveyor have a good knowledge of and the ability for practical application of these elements.

Subject 5 has had much less attention and consideration than it deserves, for its importance looms large in the field of location. Legal decisions involving the accuracy of the survey from a title standpoint depend, largely upon the care taken by the surveyor in his correlation of theory with fact. Unfortunately, there are no adequate academic courses in "Titles" as applied to surveying so that rule of thumb practices, regardless of consequences, may be corrected. Further assembled information, which can be distributed to the members of the profession is sorely needed.

Subjects 6 and 7 are generally more honored in the breach than in the observance. Too much is taken for granted and too little is actually known or investigated. Passing the burden to the other fellow for any of several excuses seems the order of the day, and causes much trouble with no gain to balance.

A profession, to be respected, must set a high standard for its members and prospective members. This can be accomplished only by the membership itself, through the highest type of efficient practice and superior ethics. Much assistance has been and can be given by the Board of Registration for Civil Engineers, operating under the provisions of the Land Surveyors' Act, but its functions are limited by law. Finally, the public must be educated to the need for and the value of good work, and for intelligent solution of its land survey problems.—*"The Registered Civil Engineer," April, 1942, California.*

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## DISCUSSION

PROF. PHILIP KISSAM (Princeton University)—The article by Mr. Wattles concisely states a principle which should be clearly in the minds of all civil engineers. This principle is that land surveying represents one of the highly specialized forms of civil engineering. The usefulness of the land surveyor's work depends not as much on precise surveying (which he must thoroughly understand) but upon his experience and knowledge of the methods and legal procedures connected with land surveying, a knowledge which takes years to acquire.

The ability to survey is frequently the first rung of the ladder which leads toward the profession of civil engineering. A young man just out of college can make a survey, and his first job is very often on a survey

corps. For this reason, civil engineers frequently think of surveyors as a sort of apprentice civil engineers. This attitude is probably wholly justified. The point is that a surveyor is by no means a land surveyor. Not only does a civil engineer confuse the surveyor and the land surveyor, but frequently the general public, the legal profession, and the surveyor himself believes that because a man can make a survey, he can make a land survey. This, of course, is entirely contrary to the facts.

Mr. Wattles also brings out the point that one of the reasons that the land surveyor is frequently considered an apprentice civil engineer is the attitude of the surveyor himself. He often forgets the public responsibility inherent in his profession. The land surveyor actually holds in trust the validity of title of lands in his neighborhood. When his work is not thoroughly accomplished, litigation ensues and title is damaged. It is his responsibility to educate the public, his clients, and his legal associates concerning the purposes and principles of boundary location. Often a client will attempt to find the surveyor who will make a "survey" for the minimum fee. An effort of this kind is like attempting to find a doctor who will operate at the lowest cost. Usually the client or the patient gets what he paid for and no more, and, as usual, the cheapest jobs become in the end the most expensive. The reputable land surveyor is duty bound to call this condition to the attention of his clients and thus contribute to the welfare of the neighborhood.

Mr. Wattles enumerates seven divisions forming the foundation of land surveying. The present writer would like to add one more. A land surveyor must have a thorough knowledge of the locality in which he works. He must know the various partition lines as they were laid out. He must know which marks can be relied upon and which are in error. He must be familiar with the men who have preceded him, knowing their characteristics and abilities, so that he can judge the accuracy of their work and the possibilities of error in their results. Local customs are important to him. For example, in one locality, a "circle of stone" means the base of an old hay mow, in some places Irish measure is used, in some localities dishonest surveyors always halved measured distances, relying on blazed trees to hold the corners, in order to make the computed areas one quarter of the actual acreage. It would be very difficult for a surveyor, for example, accustomed to methods in the western states to be confronted with a description which read "twenty-one fence rails." In other localities this would have read "three and one-half chains" because a fence rail is eleven feet long.

It is indeed a pleasure to see an article like that written by Mr. Wattles, and I am sure it will be read with great interest in the Bulletin.

# WAR TRAINING PROGRAM*

PROF. DOUGLAS S. TROWBRIDGE, New York University

ONE of the first things I teach my students in Seminar is that, in the preparation of a paper to be presented before any organization, statistics should be "cut to the bone" or eliminated entirely, as nothing is more boring than to have a multiplicity of figures thrown at the audience. However, I am afraid that this is going to be a case of "don't do as I do but do as I say," for I am going to include some statistics, without which this discussion would not mean very much. I hope you will bear with me and not let the figures "get you down."

Just to get the proper setting for the picture let me quickly review the history of the War Training Program even though it is an old story to most of you. About October, 1940, a program of training courses was set up under the control of the Office of Education in Washington and known as the Engineering Defense Training (EDT) program. Not many months later, it was decided to include subjects that could not be classified strictly as engineering subjects so the name was changed in July, 1941 to the Engineering, Science, and Management Defense Training (ESMDT) program.

A few figures will give you some idea of the magnitude of this program. From October, 1940 until July, 1941 there were 107,830 enrollments in the subjects classified as EDT. I have no way of knowing how many may have enrolled for two or even three different subjects, so I cannot give you any statement as to the number of people who received such training, but I estimate that the number would be at least 60,000 to 80,000. Figures were not available to me as to the number of subjects offered under this program.

In July, 1941, the ESMDT program started and 196 institutions offered a total of 7,852 courses with 438,503 enrollments. They were broken down as follows:

| | |
|---|---|
| Engineers | 350,564 |
| Chemists | 7,914 |
| Physicists | 5,813 |
| Production supervisors | 74,212 |
| Total | 438,503 |

The Engineering, Science, and Management War Training (ESMWT) program, which started in July 1942, was even more ambitious, as 214 institutions gave a total of 11,385 courses with an enrollment of 481,374. Additional courses have been authorized for an estimated enrollment of 78,067. These enrollments are broken down into:

*Presented at Annual Meeting, Washington, D. C., June 5, 1943.

| | *In active or completed courses* | *In additional authorized courses* |
|---|---|---|
| Engineers | 362,891 | 59,429 |
| Chemists | 10,307 | 3,129 |
| Physicists | 9,691 | 651 |
| Production supervisors | 98,485 | 14,858 |
| Totals | 481,374 | 78,067 |

Now just where do the surveying and mapping courses fit into this general picture? Let us consider only the ESMWT program started last July. Of the 481,374 enrollments in active or completed courses, only 18,751 or about 3.9 percent were in strictly civil engineering courses. In the 78,067 enrollments in the additional authorized courses, it is expected that there will be 3,882 or about 4.9 percent in civil engineering courses. This seems like a rather small percentage of the subject matter devoted to civil engineering, and it is a small percentage, but here is a significant thing. Of the 18,751 civil engineering enrollments in active or completed courses, 8,699, or 46.4 percent, were for some form of surveying and mapping, while it is estimated that 1,289 or 33.2 percent of the 3,882 expected enrollments in the additional authorized civil engineering subjects will be in surveying and mapping. This looks as if surveying and mapping is not being entirely forgotten in this picture, even though the numbers may be small when considered in terms of the grand total.

Let us break this down further and see just what is being done in surveying and mapping. Of the 214 institutions giving ESMWT courses from July, 1942 through April 30, 1943, just 82 of them gave one or more courses in surveying and mapping of some kind. In 16 states, no institution was giving surveying and mapping courses under the auspices of ESMWT.

These 82 institutions gave a total of 190 distinct courses in surveying and mapping, and I imagine that many of these courses were repeated one or more times although I have no figures on this point. I have attempted to classify them according to subject matter although it was a little difficult as a few of the courses contain the material of more than one classification.

| | *No. of courses* |
|---|---|
| Photogrammetry | 39 |
| Plane Surveying | 62 |
| Plane-Table Topography | 5 |
| Topographic Mapping | 39 |
| Topographic Surveying | 5 |
| Route Surveying | 6 |
| Geodetic Computations | 2 |
| Cartography including Military Map Making | 32 |
| Total | 190 |

Had time permitted, I would have written to many of the institutions giving these courses in surveying and mapping, to determine just how many of their students were placed in some form of surveying work as the result of these ESMWT courses. However, time would not allow me to do this so I can only give you our experience at New York University. In my first course in Photogrammetry, the draft boards managed to take some of my students before the end of the course so that only 16 students completed the work in a satisfactory manner. Of this number 8 were placed with the U. S. Geological Survey. Recently, 3 of this number have been drafted and all of them are stationed at Fort Belvoir, Va., doing Multiplex work.

In Topographic Mapping, 24 students, mostly girls, completed our course last summer and 16 of them obtained positions in the office of the U. S. Coast and Geodetic Survey in New York City.

Our Photogrammetry course was given twice during this college year and only seven of the students applied for work through the U. S. Civil Service Commission. The small number of applications is due in part to the fact that the draft boards are taking a larger percentage of the students, and also because a large number of men from the Army Map Service are enrolled in the course that will finish about June 23rd.

We gave one course in Surveying Instruments and Field Procedure II but, for some reason, none of the students applied for positions with any of the governmental agencies. This course was not repeated as we saw no point in giving it unless the students were going to make use of it in a useful manner.

In conclusion, I would suggest that the American Congress on Surveying and Mapping might well consider the formation of a committee to study the needs of governmental agencies and private industries in the field of surveying and mapping; and that they point out these needs to colleges that, by virtue of staff, equipment, location, and previous interest, can be expected to give the courses to satisfy these needs. Of course this was done in a general way by the committee that met in Washington in December 1941, but then the appeal was made as a general appeal to all colleges. If the need still exists, special appeals to colleges chosen as I have indicated, may prove more successful.

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**CARTOGRAPHY—16TH CENTURY STYLE**

So geographers in Afric maps,
With savage pictures fill their gaps,
And o'er unhabitable downs,
Place elephants for want of towns.
—*Jonathan Swift.*

# Federal Surveying and Mapping Agencies

This is another in the series of sketches of the history, purpose, and scope of activities of federal agencies engaged in surveying and mapping.—EDITOR.

## ARMY TOPOGRAPHIC ENGINEERS*
### (THE CORPS OF ENGINEERS)

THE need for topographic engineers in the Army of the United States was recognized in the Congressional Resolutions of July 25, 1777, which authorized General Washington to appoint a "geographer and surveyor of the roads, to take sketches of the country, the seat of war . . . . " The prescribed functions were assigned to civilian geographers under military control until the establishment in 1794 of a Corps of Artillerists and Engineers, which took over these functions.

#### HISTORICAL

No officers with special functions of topographic engineers were provided until the early part of the War of 1812, when the Congress made provision for eight topographic engineers and eight assistants. The duties of these officers were "To make such surveys, and exhibit such delineations of those as the Commanding General may direct; to make plans of all military positions (which the Army may occupy) and of their respective vicinities . . .; to accompany all reconnoitering parties sent out to obtain intelligence of the movements of the enemy or of his position, etc.; to make sketches of their routes, . . . ."

The officers appointed as topographic engineers served with distinction throughout the War, and in the following period were employed for the siting of fortifications and for important reconnaissance work on the northern and western frontiers. By 1818 the importance of the surveys and geographic researches had so impressed the Congress that a Corps of Topographic Engineers was constituted as a distinct organization, assigned to the Engineer Department. This organization served both for military and civil purposes until 1863, when it was merged with the Corps of Engineers.

Upon consolidation with the Corps of Engineers, the topographic engineers lost their identity, but the type of work performed continued as before. There were no topographic troop units organized exclusively for that purpose, with the exception of Company "E" of the Battalion of Engineers, which

*Prepared in the Office of the Chief of Engineers, War Department.

was organized at the close of the Civil War. This company soon lost its identity as a topographic unit.

The only topographic troop unit in service with the American Forces during World War I was the 29th Engineers, which was authorized on October 13, 1917, serving in various capacities from flash and sound ranging to the operation of base and mobile reproduction plants.

Following World War I, the 29th Engineers was reorganized and took station at Camp A. A. Humphreys, Virginia (now Fort Belvoir), with "C" Company (Reproduction), at reduced strength, assigned to the Engineer Reproduction Plant, Army War College. In the lean years following, "C" Company was demobilized and the 29th, reduced to two companies, operated from Fort Belvoir, mapping a number of areas in nearby Virginia. In 1931 it joined Colonel D. I. Sultan's organization for the survey of the proposed Nicaraguan Canal, returning to the United States in 1932 for station at Fort Schuyler, New York. After mapping the New York harbor area, it was transferred to Portland, Oregon, where it has been engaged in mapping West Coast strategic areas to the present date.

## Recent Expansion

In the fall of 1939 the 30th Engineer Battalion was formed at Fort Belvoir, Virginia, and assigned to various East Coast mapping projects. At the beginning of the Army expansion in 1940–41 both units were increased to full war strength by the addition of a reproduction company, an additional survey company, and expansion of existing companies to create battalions with strengths of approximately 1,000 each. Three other types of topographic units have been adopted in keeping with the expansion of the military forces and the changes in methods of warfare. The 29th and 30th Engineers, equipped to map by universal photogrammetric processes (Aero multiplex projector) are known as Geneal Headquarters units and are designed to make maps of critical areas of potential theaters of operation, to exacting specifications. There has been designed to operate with the field forces, an Army type topographic battalion with fully mobile mapping and reproduction equipment. This type of unit will prepare, by the simplest and most rapid processes possible, hasty maps to meet immediate requirements. Normally it will prepare only medium scale planimetric maps, or large- to medium-scale photomaps from controlled aerial mosaics.

To further assist the ground forces in obtaining immediate terrain information, each corps has been and will be assigned an engineer company, (topographic). This unit is a small edition of the topographic battalion. Neither the engineer battalion (Army type) nor the engineer company (topographic) employ photogrammetric processes, although they may, when

time permits, use the simple stereoscope or the stereocomparagraph for contouring or form lining.

To meet Air Corps requirements for current revision of aeronautical charts in theaters of operations, and for the preparation of objective folders for bombardment aviation, there has been designed an engineer company (topographic—aviation). The normal assignment of this unit is one to each Army Air Force. The unit is patterned after the engineer company, topographic (Army Corps type), its organization modified to meet the somewhat different requirements of the Air Forces, particularly in the matter of the establishment of geodetic control by astronomic methods.

The global character of the present war has increased map production by the Corps of Engineers to many times the volume required during World War I. Although the American Forces involved are not as great as were engaged in 1917 and 1918, map requirements, both in total volume and in numbers of individual maps, have already far exceeded the 1917-18 requirements. Map production is governed more by geographic considerations than by the strength and composition of the military forces. Also, the advent of new weapons, particularly air elements, and the extreme sensitivity of modern armies to terrain conditions, have introduced new requirements in the way of maps, both as to character and accuracy of the information shown.

Mapping for our overseas operations has been limited in the main to compilations from existing sources of all kinds; original surveys being necessarily restricted to those areas which have been occupied or photographed by our own forces. The scope of this work has been almost unbelievable in its immensity and in the speed with which it has been accomplished. Obviously, publication of the details of this program would be unwise at this time.

## Cooperative Mapping Program

As a necessary corollary to global warfare, the Chief of Engineers has looked to the possibility of defensive operations in the continental United States and has sponsored a Cooperative Mapping Program with other federal agencies for the improvement of our mapping position in areas of strategic importance. The work accomplished to date and to be accomplished before termination of the program will be of tremendous value to any military operations in this country, as well as to our future program for the planning and construction of public works.

Surveys executed under the cooperative program have been established with an accuracy suitable for map publication at scales 1:20,000 and smaller. In all areas of primary importance, the published scale will be 1:31,680. This scale is suitable for general military use and is consistent with the pub-

lished scale of many standard U. S. Geological Survey quadrangles in adjacent areas.

It is interesting to note that in the Revolutionary War a single "geographer" was employed to provide special terrain intelligence for the Army of the United States. In 1812, 16 officers were assigned to this duty; in 1847, 36 officers were required; in the Civil War, the number of officers was increased to 48 and provision was made for one company of soldiers (never actually activated). In 1917, the topographic troops numbered 4,375 (including those assigned to flash and sound ranging). To provide terrain information at a rate commensurate with the mobility of modern armies, it has been necessary to greatly expand the functions of topographic engineers and to provide the means for obtaining and processing information with the greatest rapidity. When the full man power of the Nation has been mobilized the numbers and types of topographic troops in the military service will far exceed those of any other period of our Nation's history.

In the routine training of topographic units, an effort is made to contribute terrain information which will be of permanent value for civil as well as military use. To this end, the topographic units which are maintained during periods of peace are trained by preparing topographic maps of areas of strategic importance of which suitable maps are not in existence.

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## THE AMBIGUITY OF "EFFIE MERRIS"

Oh I am in a mental mess
About this word "Ephemeris."
Some of the younger school of thought
Pronounce it not as I was taught.
I asked a D. L. S. Said he,
"Ephemeris, was taught to me."
Our dictionary fails to show
Where the d..... accent should go.
I asked my wife. She said, "Was he,
A god in Greek mythology?"
And several O. L. S. now dare us
To prove it is not "Ephemeris."

The singular is bad enough
But when we come to plural stuff,
Would snooty folk, with nose on high,
Pluralize, "Ephemeri"?
Would movie star with golden tresses
Sweetly say, "Ephemeresses"?
Or would the plural merely be,
Ephemeris apostrophe?
But now I find it's none of these,
It's really "Ephemerides."

Ah, me! No more my brain I'll wrack,
I'll call the thing an Almanac.

*—A. A. Outram in the Canadian Surveyor.*

# CARE OF SURVEYING INSTRUMENTS IN UNFAVORABLE WEATHER*

LOUIS H. BERGER, President, C. L. Berger & Sons, Inc.

SUCCESS in conducting instrumental surveys under extreme weather conditions depends on having proper instruments and equipment and on following practices which have been found productive of acceptable results. An effort is made here to contribute information which it is hoped will aid in accomplishment of engineering tasks.

## DESIGN

No instrument will be suitable for surveys in extremely low temperatures unless it has been carefully designed for such conditions and the metals of its bearing parts have been selected to assure the necessary movements without binding. This is of primary concern to makers of surveying instruments, who are interested primarily in proper designs and the employment of the best materials to assure satisfactory performance under all weather conditions and in all climates where surveys are to be carried out.

The combination of steel in contact with gray cast iron affords an almost ideal joining of metals to form a center bearing, because the coefficients of expansion of these materials are nearly the same. Unfortunately, however, neither of these metals may be used on an instrument which is equipped with a magnetic needle. For instruments equipped with a magnetic needle, the best combination for centers is bell metal and bronze. After proper bearings, there must be considered the simplicity of design and ease in making adjustments and readings. A mounting of the telescopic alidade, which provides for rotating the barrel through 180 degrees about its axis, illustrates a simple but effective design without which this instrument is neither satisfactory nor capable of giving entirely reliable results. Ease and sureness of reading a level, result from the prism bubble-checking instrument. Just as no instrument will serve well unless it be kept in adjustment, none can be quickly and satisfactorily adjusted unless properly designed. No matter how well designed an instrument may be, its proper care and use are absolutely essential.

## CARE, SERVICE, AND REPAIRS

Some of the simpler repairs can be made in the field; others can only be made by the skilled mechanic in a shop equipped for the purpose. It is wise to keep a spare instrument at hand to put into use when an instrument in service becomes seriously deranged.

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The user of the instrument should be competent to distinguish between those adjustments and repairs which he can and ought to be prepared to make in the field, and those which only the maker with proper equipment should attempt. Repairs that are practicable in the field are: (1) replacement of a diaphragm; (2) replacement of a spirit level vial; and (3) replacement of the tangent, leveling, and clamp screws. Spares of these articles should be included in the equipment.

On the other hand, it is better to put up with a little dust on the interior surfaces of lenses and on the crosshairs than to attempt to clean them in the field. If it should become necessary to clean these parts, complete instructions issued by the maker of the instrument should be followed.

Lubrication requires particular attention. For use at ordinary temperatures the centers are serviced with good watch or clock oil, but in cold weather, either a special oil or graphite must be used, the normal oil first having been thoroughly removed from the bearing surfaces. It is more generally customary to employ graphite. This is always available in pencils and may be scraped off to form a powder, or the bearing part may be rubbed with the pencil point. Either a mixture of kerosene and watch oil, or kerosene alone is used by some with good results. Clean, soft cloth, and a stick shaped to reach the bottoms of sockets, should also be provided in the service kit.

The lowest temperature, under calm and dry atmospheres, in which precise leveling can be carried on is about 40 degrees below zero Fahrenheit. Under such conditions it is advisable to use three layers of handcovering (knitted woolen gloves next to the skin, woolen mittens over these, and on top a soft leather mitten). Excessive and varying refraction is liable to interfere with accuracy of observations. It may be difficult to detect, so the observer must be alert to its presence. On ice it is usually worst in the early morning and late afternoon.

It is universally agreed that in sub-zero temperatures the instruments should never be taken into heated buildings or tents. To take them into warm places is liable to cause moisture to form in the telescope, which may later freeze and interfere with focusing and sighting. When making observations, the eyepiece is liable to be coated with a film of ice from breathing, and in humid atmosphere the surface of the objective also. This may be removed with a pointed piece of wood, or by pressing a bare finger against the surface for one or two seconds. The observer may reduce coating of the eyepiece to a minimum, by holding his breath momentarily, while actually looking through the telescope.

Stiffness in turning on its spindle usually indicates that the lubrication of the instrument is faulty. Thorough cleaning of the spindle and retreat-

ment with proper arctic oil or graphite will eliminate this difficulty.

All metal screw heads should be covered with chamois or adhesive tape. Some instrument makers have substituted bakelite or other plastic materials for metal in screw heads. Instruments of light weight facilitate movements on snow, and ease of making observations is of prime importance when working under arctic handicaps.

Astronomic observations ordinarily require a considerable length of time at a station. An observation tent without a top may be used to provide for the comfort of the personnel and to increase the reliability of readings. Whenever practicable, a heated tent should be placed at a distance from the instrument for the observer and attendants to thaw out between star passages and observations.

### Difficulties in Set-up

Difficulties are often encountered in the set-up. On snow or ice or swampy ground, aids usually must be provided. Powder snow, when too deep to be shoveled away to reach solid ground, is particularly troublesome. In leveling, blocks of wood may be placed and tamped to give a stable footing for the tripod. In triangulation from the summits of mountains, the tripod may be solidly anchored by first melting some snow and then pouring the water thus obtained onto snow heaped around the shoes of the tripod to form a solid mass of ice. A small liquid-fuel stove should be taken for the purpose. In astronomic observations it may be best to excavate the snow and set up on the frozen ground below, the pit formed providing shelter for the observer. In wet ground or swamps, footings are provided by driving stakes long enough to reach solid material below. A platform may be erected for the observer if necessary. On ice, a small axe is used to chop notches for the tripod feet. Tripods with long legs are required in deep snow, and for use on ice the shoes should have sharp points.

### Leveling on Frozen Bodies of Water

In some instances, lines of levels have to be carried across bodies of water on ice. Whenever it is practicable on lakes, this should be done by means of surface readings with gages, as is done during seasons of open water. Results so obtained are reliable and expeditious when considerable distances are involved.

This procedure is not practicable on rivers which, when frozen, may offer a more practicable route for a level line than on shore because of less snow cover. In working on river ice, the chief difficulties arise from wind and surges beneath the ice which interfere with bringing the instrument to the level position and keeping it there long enough to get readings.

Considerable wind may interrupt the work altogether. Wind shields will aid in stabilizing the instrument. They can readily be made of canvas or balloon cloth, with sleeves along two edges for insertion of rods to set and hold the sheet in place. Vertical movement of the ice sheet by surges, if not too violent to permit accurate readings to be made, does not, of itself, necessarily prevent the carrying forward of levels. Near open water at rapids and falls, however, the rise and fall of the ice sheet is too rapid for leveling.

In this connection it may be stated that sounding of stretches of rivers being surveyed for deepening to improve navigation can be completed most readily and effectively on ice by use of a drilling machine to cut required holes. In this case the ice is gridded with transit-traverse lines and depths measured at the intersections of the grid lines.

### Surveying During Periods of Precipitation

A final comment is offered on the topic of surveying in rain or snow. Moderate precipitation does not necessarily stop certain kinds of instrumental work, for example leveling or stadia traverses, but rain is liable to trickle into the telescope and cause trouble eventually. Readings on rods may have to be reduced to shorter distances than are practicable in fair weather. Along much of the Alaska Coast, and in other regions in high latitudes, rain is prevalent through much of the year and snow during the cold season. However, it is possible to carry out field operations on many days of light rain or snowfall. Some surveying instruments will shed water better than others, but none is wholly waterproof. It is well to have a waterproof covering to place over the instrument during those periods when the precipitation is heavy and to keep handy a cloth to mop up accumulations of water.

Using white sheets of celluloid, instead of the usual paper sheet, plane-table surveys with the telescopic alidade may be continued at a reduced rate. Cross wires of spider webs are not suitable for wet-weather work. The wires should be of platinum, or the diaphragm should be of glass with etched cross lines. After working in the rain, the instrument should be thoroughly dried before putting it away for the night.

It is hoped that the foregoing information may be of help to many who have work of this kind to do under adverse weather conditions. The conclusions reached are the results of years of study of the experiences of engineers, explorers, and surveyors in many parts of the world. The assistance rendered by them in giving accounts of their difficulties and of how they coped with them and carried on their work successfully is gratefully acknowledged.

# CARTOGRAPHY IN LATIN AMERICA

DR. ANDRE C. SIMONPIETRI

This report on the work of the Committee on Cartography of the Pan American Institute of Geography and History, was presented at the Third Annual Meeting of the Congress by Dr. Simonpietri, Secretary to the Committee. The talk was illustrated with colored slides representative of the types of information being assembled. —EDITOR.

THE Committee on Cartography was set up at the Third General Assembly of the Pan American Institute of Geography and History in Lima, Peru, in April of 1941. The resolution presented was adopted unanimously by the delegates of all 21 American Republics, and called for a body of experts made up of one member from each nation, from among whom a Chairman was to be elected, and a Secretary who was to act as the Committee's traveling representative for maintaining close liaison between the national members and the headquarters of the Committee in Mexico City, seat of the Institute.

The duties of the Committee include the promulgation of standards for the various classes of maps needed in, and produced by, the various nations, to the end that uniform standards may be adopted; provision for the regular exchange of information on current and proposed mapping activities, and on technical methods currently employed or in the experimental stage; and the advancement of education and training in the sciences of map making, through the organization of university courses, and the exchange of professors and instructors as well as of technical personnel. It will be seen, therefore, that "cartography" is understood in the broad sense of embracing the whole field of surveying and mapping.

It was obvious from the very beginning that it would be quite impossible to adopt uniform rules, or even to make concrete suggestions in this connection, without a clear understanding of just what standards were being employed. The *sine qua non* of effective procedure seemed to be first to obtain a comprehensive picture of the actual status of mapping throughout the hemisphere, then to proceed to a consideration of ways and means by which correctives or changes should be applied.

The initial effort of the Committee, therefore, was to compile in each nation a comprehensive report on the actual status of mapping, complete with index charts showing the status of geodetic control, completed and under way; the actual status of map production, series by series; and with copies of sample maps and technical publications dealing with methods and procedure. In order that these reports might be uniform, a questionnaire was drawn up to serve as a guide. The total report is conceived as

a book, of which each national report forms a chapter. Each chapter has its own introduction in the form of a background sketch of the history of mapping in that particular nation. It will then present, for each governmental or commercial agency, the data gathered, which will cover the following points: origin of agency and objectives for which created; kinds of maps used in its work; description of these maps, scale, size, symbols, etc.; the internal organization of the institution and its directive personnel, including their names; description of both field and office methods; distribution and destination of the completed work; use of data obtained from other agencies; and a bibliography of technical works prepared and published.

In addition to the textual statements the Committee is procuring colored photographs, both motion and still, of the heads of the various cartographical agencies and their principal staff members; of the buildings, and surroundings in which such activities are carried on; and of significant technical apparatus and equipment used. Biographical data is also being assembled of those associated with cartographic work, and a nation-by-nation directory is being prepared.

Another of the Committee's activities which has been very well received is the preparation of a glossary of scientific terms used in surveying and mapping. The glossary is being prepared in English, Portuguese, and Spanish. American, Mexican, Colombian, and Brazilian scientists have to date assisted in the preparation of a preliminary listing, to be submitted as soon as practicable to all nations for appropriate corrections and additions.

In the first year of the Committee's operation these surveys have been initiated, through visits of the Committee's Secretary, in Mexico, Venezuela, Brazil, Bolivia, Peru, Ecuador, and Colombia. The "tools" employed in the course of these survey trips include a master Index Chart, on which has been plotted in colors all that we know of control work done in Latin America (triangulation, traverse, leveling, gravity, and magnetic operations); a listing of all official publications consulted in the compilation of the Index; a questionnaire; biographical data forms; and two cameras, a 35 mm still and a 16 mm motion.

It is proposed to continue the survey work now under way in the nations mentioned, and to extend this as rapidly as possible to the remaining nations of Latin America. Agencies' statements will be published and distributed among the American Republics as rapidly as the total of such statements in any nation is completed. Photographic material will also be disseminated as rapidly as it becomes available. A 16 mm motion picture film, in color, entitled "An Introduction to Cartographic Activities in the United States," is already completed and is being exhibited with Spanish titles in Latin

America. Another copy with English titles is being exhibited in the United States, and will also be shown in Canada.

The cooperation received to date has been wholehearted and most encouraging. A wealth of important data has already been submitted by governmental agencies, professional societies, and commercial concerns. This collection is constantly growing. It is apparent that as a result of the Committee's work there is an increasing consciousness of the inter-relation and common interest in cartographical work as between neighboring nations. An instance of this is the cooperative work now being done by the Governments of Venezuela and Colombia along their common boundary, originally suggested by the Committee.

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## CARTOGRAPHIC FILM SHOWN IN REGION 3

The color film, "Cartographic Activities in the United States," was shown in Chattanooga, Tennessee, on July 1, to an overflow audience composed of members of the American Society of Photogrammetry and the American Congress on Surveying and Mapping. The film elicited many favorable comments. From Chattanooga it was sent to Portland, Oregon to Mr. Lewis A. McArthur, Vice President of Region 9.

[For a description of this film, and information regarding its availability to Regions of the Congress, see the April, 1943 Bulletin.—EDITOR.]

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## THE MOST IMPORTANT POINT ON OUR CONTINENT

From the standpoint of the surveyor, mapmaker, or chartmaker of the United States, the most important point on this Continent is a triangulation station called "Meades Ranch" located in central Kansas. This station was established by the U. S. Coast and Geodetic Survey, and is the starting point for the computations of all geographic positions for all of the triangulation of the United States, Southeast Alaska, Canada, and Mexico.

Its geographic coordinates are:

Latitude = 39° 13′ 26″ .686 N
Longitude = 98° 32′ 30″ .506 W

# APPLIED PLANE COORDINATES

Report from Mapping Section: Staff of Maryland State Liaison Officer

AT a meeting of the Congress on Surveying and Mapping two years ago, a suggestion was made that the common acceptance of the State Plane Coordinate Systems might be hastened if practical application were found for them in connection with everyday experiences in giving map directions. For example:

A gentleman living in a rural community invites his city friend to visit him, but has great difficulty in describing the way. To him it is simple just to follow such and such a road as he himself has been traveling day in and day out, but he forgets a certain fork which sends his city friend off the track for a wild goose chase over half the county. How simple it would be to say, "I live at East 793 North 429. Look on that new State highway map which you have in your car and there you will find me."

The inconvenience of arriving, much to the hostess' distress, after the steak has been over-done is little compared with the serious situations when there is sickness in the night. An ambulance is wanted for a case of acute appendicitis; a man's barn is on fire; a crime is committed, or any of a number of things for which the State police are actually called. The man telephoning is excited. His directions are not clear. He uses the local names of places that have never been recorded on any map. If on the other hand he could read his coordinates from a card posted near the telephone, at once the sergeant at the desk would have a clear picture of the situation and could send help by the shortest way, even directing cruising radio cars to the spot merely by broadcasting the coordinates.

The suggestion made invoked no further discussion at the meeting and the subject was dropped, the seed falling on barren and rocky soil until in Maryland the application for coordinated maps became appreciated in connection with defense. Here it has germinated and although the above picture is a long, long way in the future, nevertheless very definite steps have been taken by the Maryland State Police and other cooperating State bureaus and military organizations.

Progress in the development of any such means of communication is necessarily slow at the start, for the reason that it is useless until it is well understood at both sending and receiving ends. It has to begin with the preparation of adequate maps coordinated according to some established system, as in this case the Lambert conformal conic projection recommended by the U. S. Coast and Geodetic Survey. The first application began with intercommunication between county liaison officers and the State communication center, and then expanded as outgoing messages were sent to the various military units and other defense organizations required map directions; consequently, these agencies adopted the same system.

A definite step forward in civil use was taken when the Department of

Forests and Parks decided to use State grid coordinates for the location of forest fires, even though it meant shifting the aiming circles slightly from true meridian to grid meridian. This step was particularly important since this department works in close cooperation with the State police, each rendering valuable assistance to the other. Consequently, a common map language is highly desirable. Two electric utility companies have already indicated their desire to cooperate in the reporting of fires by providing their line patrolmen with coordinated maps so that fires seen by them can be quickly reported by telephone using this common map language.

Another important step was taken by the Baltimore and Ohio Railroad which plotted all of its trackage on U. S. Geological Survey quadrangles and then determined the coordinates of all mileposts, stations, important crossings, bridges, and tunnels to the nearest thousand feet. Now should a track gang report an incipient forest fire by milepost number, the office of the general superintendent of police can quickly translate to State coordinates and call the Department of Forests and Parks.

Although the goal is still far away, a good beginning has been made and sufficient experience has already been gained to show clearly the way ahead. Interest is constantly being shown by those who are now ready and anxious to enlarge the circle and thus make the application of this system more general and effective. The Traffic Division of the State Roads Commission has in progress a new highway map for popular use. When this becomes available to the public, it will be a real contribution toward the time when the city friend won't be too late to enjoy his country host's dinner because he lost his way.

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## COMMENT

CAPTAIN C. L. GARNER (U. S. Coast & Geodetic Survey)—The above article is most enlightening because it shows the application of plane coordinates to many important problems other than those having to do strictly with surveying. The test of any new product is in the use thereof, and the same principle applies to State plane coordinates. While the advantages to be gained from the use of a coordinate system seem obvious to many, undoubtedly the general public will be slow to use them until their value has been demonstrated.

The important consideration in the selection of a scheme of coordinates is that from the large number of possible systems the one should be selected which will be of the greatest general benefit. The Maryland system of grid coordinates, and the systems adopted for other states were developed so that there would be as few zones as possible, with small scale errors, and which would give an accurate and simple base for coordinating local surveys.

The steps described in this report show an interesting move toward the ultimate goal of coordinating land surveys of various origins so as to effect tremendous economies in the simplification of registration of land. The possibility of obtaining more

effective police and fire protection in rural communities through the use of such a system is alone of very great value. The experience gained in Maryland is recommended for consideration by other states.

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## PORTABLE TELEPHONE FOR SURVEYORS

A "listening aid" commonly used by radio service men in detecting noises in radios has been adapted to the use of survey crews operated by the California Division of Highways. The device consists essentially of two radio tubes, some small A and B batteries, and a universal microphone set in a small box, together with a pair of insulated wires about 300 feet long leading to receivers of the "head set" type.

The microphone box is suspended from a light portable support near the levelman so that he may speak into it. The head set at the other end of the wires is worn by the recorder who moves along with the chainmen and hence may be a considerable distance away from the levelman. The recorder drags the wires along with him as he moves ahead; the levelman takes the "mike" when he moves to a new set-up.

The need for some such device became apparent when noises along the highways were found to drown out the voice of the levelman calling to the recorder even when the latter was only a short distance away. Even by increasing the number of instrument "set-ups" between the bench marks (normally set a thousand feet apart) there was difficulty in communication. Ordinary highway traffic is not the sole cause of interfering noise; near a flying school it is airplane motors, sometimes it is railroad trains or the din of an army truck convoy, and on windy days voice range is greatly shortened.

With the listening aid, rod readings spoken by the levelman in a low voice can be heard by the recorder easily where it would be impossible to hear his shouts without the use of this aid to hearing. Altogether the device has saved many mistakes in recording, has considerably increased efficiency, and has eased the strain of working beside main highway traffic. The equipment does not interfere with radio and its use is not restricted by any present wartime regulations.

A recent description of the device in "California Highways and Public Works" by R. S. Badger, district construction engineer, gives credit for developing this scheme to C. F. Oliphant, resident engineer, California Division of Highways at Fresno, California.—*"Engineering News-Record, (News Issue)," April 1, 1943.*

# STRANGE PROPERTY DESCRIPTIONS

JAMES E. CONNAUGHTON, City Surveyor

Many of our readers, in their researches or experiences, have doubtless encountered oddities in deeds, or strange descriptions of land. We would appreciate their communication for inclusion in the Bulletin.—EDITOR.

THE old surveyors preserved their lines by running ditches. These were dug about 2 feet deep, 2 feet wide at the bottom and 3 feet at the top. Many of the lines were more than a mile long. A few years ago I had occasion to survey several properties in Easthampton, Long Island, and as this section is woody, I employed a number of field assistants who were familiar with it. In running some of my lines, I found that the ditches made years ago coincided with my lines and were straight. But on other properties in the same vicinity, I found that the lines I ran did not follow the ditches. The older men in my party explained why. "You see," said an old timer, "the reason is simple. The straight lines were 'pork' ditches and the poor lines were 'rum' ditches." He said that the old-time surveyor would hire two gangs of men, one to start from each end of the line and work toward the center. Different surveyors would offer different prizes to their gangs, sometimes pork, sometimes rum. In one case the gang reaching the center first would receive a pig (pork) as a prize, but in the other, the gang reaching the center first would get a large jug of rum. This latter gang, being a drinking class, would not work as carefully as the sober gang, hence, the "rum" and "pork" ditches.

A peculiar description which puzzled me was a "four load" and "five load" meadow. An old timer explained that his grand-dad knew the meadow very well. He said his forebears could cut four loads of grass from one piece and five loads from the other, so the property was always known as the Four Load and Five Load Meadow.

Then there was the "shift" meadow, and again an old timer had to come to my rescue. It was explained that a certain man had two sons and divided his acreage in two parts. The elder son was, in alternate years, to mow and cart the grass from the section nearest the home, and the younger the other. At the time of the father's death, the one working the home acre was to own it from that time on. And so it was called Shift Meadow.

Another description which I ran across was the "mean" acre and the "fair" acre. This was explained to me as property surveyed by the farmer himself. The farmer would measure the circumference of his cart wheel, then tie a piece of rope to part of the wheel rim. Each revolution of the wheel was counted until the number of feet around the tract was

sufficient to make up an acre. In the case of a "fair" acre, consideration was given to the smoothness of the area over which the cart traveled. The "mean" acre was considered not so accurate since the wheel went over large stones, logs, or bogs—hence, the "mean."—*"Field Engineers Bulletin," U. S. C. & G. Survey, December, 1939.*

## ANOTHER ODD DESCRIPTION

In the Probate Court Record at Hartford, Connecticut, there is a description of a piece of land conveyed in 1812 which contains the following clause:

" . . . thence after turning around in another direction and by a sloping straight line to a certain heap of stone which is by pacing just 18 rods and about ½ rod more from the stump of the big hemlock tree where Philo Blake killed the bear . . . "

## FINANCIAL STATEMENT

As of June 30, 1943

| Receipts | | Expenditures | |
|---|---|---|---|
| Transfer of account by check | $262.65 | Printing | $270.75 |
| Transfer of account by cash | 4.56 | Mailing service | 45.71 |
| Memberships (Commercial) | 75.00 | Office supplies | 57.01 |
| Memberships (Libraries) | 6.00 | Stenographic service | 9.72 |
| Memberships (Individual) | 912.00 | Banking service | 2.96 |
| Annual Meeting | 101.00 | Annual Meeting | 20.93 |
| Total receipts | $1,361.21 | Total expenditures | $407.08 |

| | |
|---|---|
| Balance in bank | $954.13 |
| Unpaid obligations | 101.20 |
| Net worth of Congress | $852.93 |

The above statement covers the period from November 7, 1942, the date I assumed office, to the close of business, June 30, 1943.

Respectfully submitted,

WARREN T. ELLIS,

Treasurer.

APPLICATION FOR MEMBERSHIP

## AMERICAN CONGRESS ON SURVEYING AND MAPPING

Date.....

*To the Board of Direction*:

I hereby apply for membership in the AMERICAN CONGRESS ON SURVEYING AND MAPPING and agree, if this application is accepted by the Committee on Admissions, to be governed by the Constitution, By-laws, and Rules of the Congress while holding membership.

.....
(Signature)

•

PERSONAL INFORMATION
(Please typewrite or print)

Name.....
(With desired title of address)

Occupation (with title of position or rank).....

☐ Business address.....

☐ Home address.....
(Indicate by check where Congress communications are to be sent)

City and State.....

State education above high school. Name institutions and give degrees, year, and special training in surveying:

State what practical experience in surveying and mapping you have had:

Please give two references (not necessarily members of the Congress).

Name Address

(1).....

(2).....

•

Annual dues of $4.00 are payable on notification of acceptance and entitle members to all privileges of the Congress and to all its publications.

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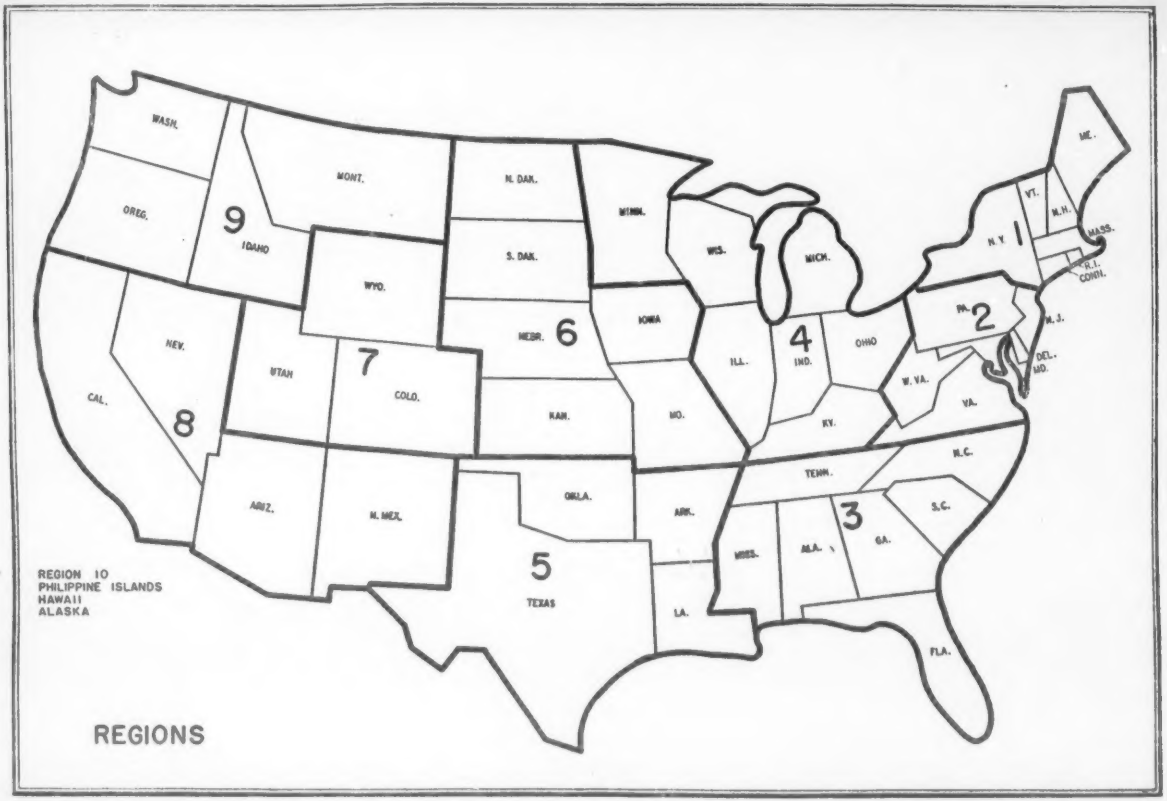
*Mail application to Acting Executive Secretary*
AMERICAN CONGRESS ON SURVEYING AND MAPPING
Box 470, Benjamin Franklin Station
WASHINGTON, D. C.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PHILIPPINE ISLANDS
HAWAII
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REGIONS